# ABSTRACT OF THE DISCLOSURE

A Medium Access Control ("MAC") Layer protocol and a method for contention resolution using the protocol is provided for networks with multiple priority traffic. The protocol is used where a physical layer connected to a transmission medium uses a carrier modulation scheme with multiple frequencies. Stations on the network that desire access to the transmission medium use a carrier modulation scheme with multiple frequencies. Stations that desire access simultaneously transmit a single frequency selected at random from a set of physical layer frequencies during an open-contention-interval. At the same time, the stations listen to a combined frequency signal and analyzes it for frequency content. The station whose own frequency matches the highest frequency signal in the combined signal gains access to a transmission medium. In the event of a collision, a restricted-contention-interval is used only for the colliding stations. The probability of successful contention resolution increases very rapidly using the restricted-contention-interval. By partitioning the set of frequencies in contiguous ranges, multiple priority classes can be used with the contention method and the MAC layer protocol.